

1.3 Box and Whisker Plot

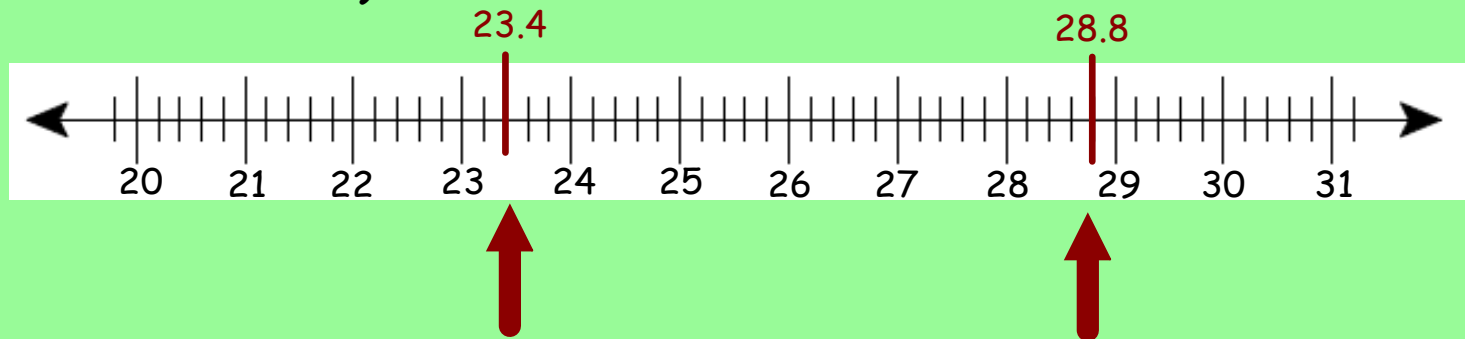
Box and Whisker Plot = a type of graph used to display data. It shows how data are dispersed around a median, but does not show specific items in the data.

How to form one:

Example: The data below represents how long it took people to eat at a local restaurant. It has been put into order.

23.4	24.3	24.8	25.0	25.1	25.2
25.9	26.1	26.4	27.0	27.3	28.8

1) Draw a number line and mark the **lower** and **upper extremes** (the least and greatest data values).

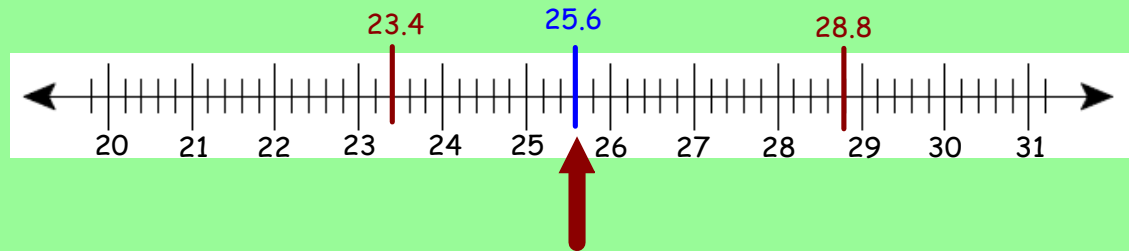


2) Find the median of the data and mark this on the number line.

There are 12 numbers --> your median in this example is between the 6th & 7th number:

$$6^{\text{th}} \text{ number} + 7^{\text{th}} \text{ number} = \frac{25.2 + 25.9}{2} = \frac{51.1}{2} = 25.55 = \boxed{25.6}$$

Mark this spot on your number line:

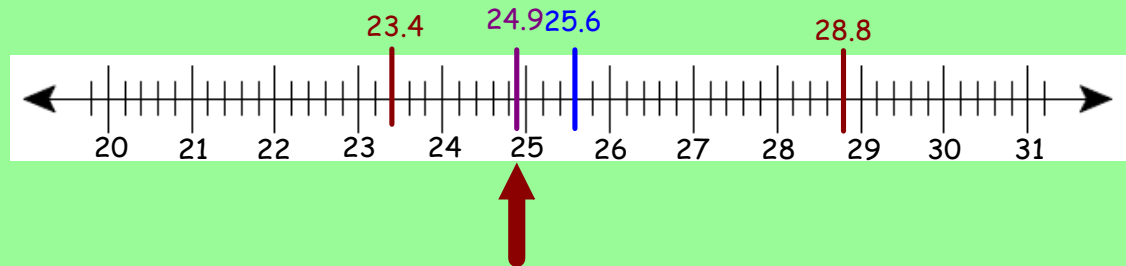


3) Find the **lower quartile** (median of the lower half of the data), and mark this on the line.

median (lower half) => the middle of the 1st set of numbers

$$\text{median (lower half)} = \text{so between the } 3^{\text{rd}} \text{ and } 4^{\text{th}} \text{ number} = \frac{24.8 + 25.0}{2} = \boxed{24.9}$$

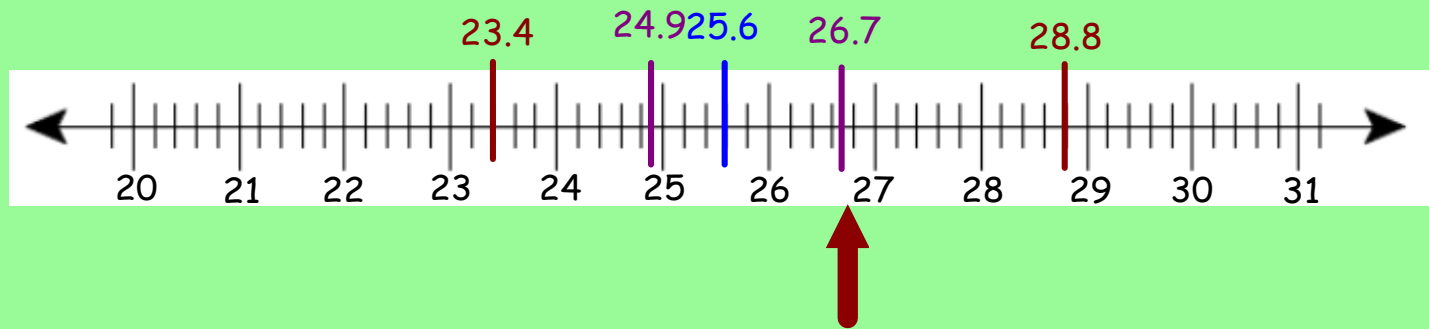
Mark this spot on your number line:



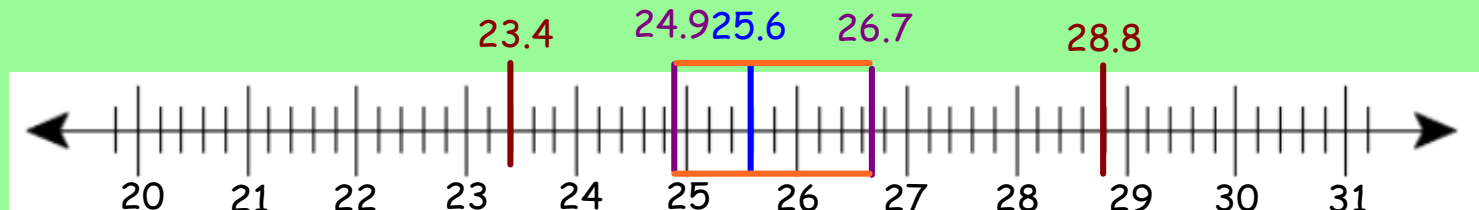
4) Find the **upper quartile** (the median of the upper half of the data), and mark this on the line.

median (upper half) = the middle of the 2nd set of numbers

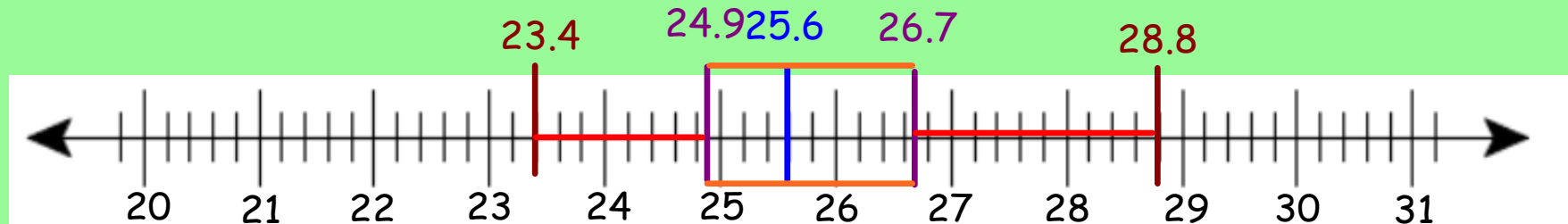
$$\text{median (upper half)} = \text{between the 9}^{\text{th}} \text{ and } 10^{\text{th}} \text{ number} = \frac{26.4 + 27.0}{2} = \boxed{26.7}$$



5) Construct a **box** connecting the upper and lower quartiles. Make sure to label the median, upper and lower quartiles.

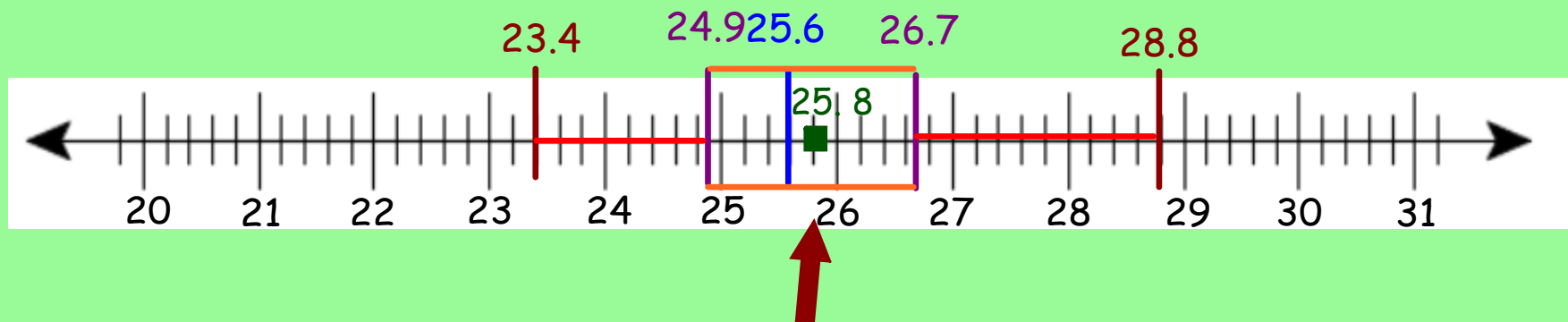


6) From the upper quartile to the upper extreme draw a line. From the lower quartile to the lower extreme draw a line.

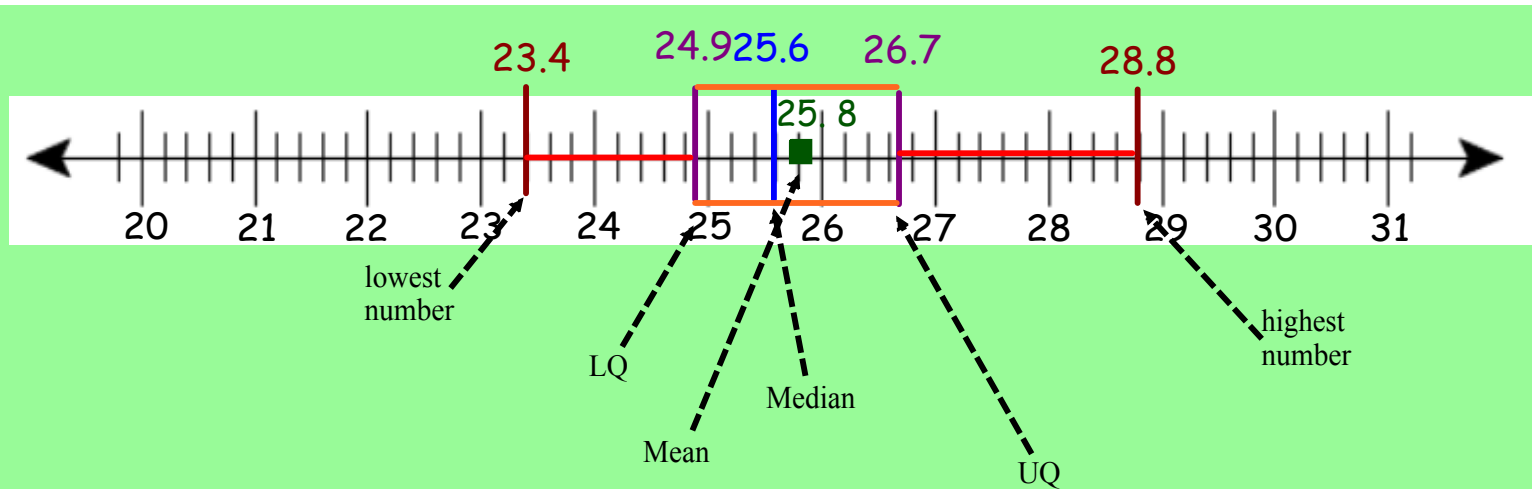


7) Add in the mean by representing it as a box.

$$\bar{X} = \frac{\sum}{n} = \frac{309.3}{12} = 25.77 = \boxed{25.8}$$



Box & Whisker Plot	
Advantages	Disadvantages
<ul style="list-style-type: none"> • highlights outliers • shows median • shows where the middle 50% of the values are found 	<ul style="list-style-type: none"> • does not show all data values • does not indicate the number of data values • mean and mode cannot be found using the display



1. What could be classified as the outliers of this data? Why?
2. What does this box and whisker tell us about the average?
3. What would a typical time to eat at the restaurant?
4. How much time would 50% of the people take to eat at the restaurant? (Between which two numbers?)